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EXAMINER

MCCLLOUD, RENATA D

ART UNIT PAPER NUMBER

2837

DATE MAILED: 03/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/998,735

Applicant(s)

EHSANI ET AL.

Examiner

Renata McCloud

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/30/2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,26-36 and 41-48 is/are allowed.
- 6) ☒ Claim(s) 2-5,9-13,18-20,22-24,37-39 and 49-59 is/are rejected.
- 7) ☐ Claim(s) 6-8,14-17,21,25 and 40 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 03/07/2002.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 50 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

The claim is a run-on sentence, making the claim unclear. The claim reads several different way including: (a) the phase current profile comprises a current turn-off instant, wherein the current turn-off instant defines (i) a desired instant at which the phase current is turned-off, and (ii) a current turn-off profile defining a desired decay of the magnitude of the phase current from the magnitude of the phase current at the turn off instant to zero; (b) the phase current profile comprises a current turn-off instant and a current turn-off profile.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 2-5, 9-13, 18-20, 22-24 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by MacMinn et al (US 4,933,620).

Claim 2: A method comprising generating by a computer (Col. 8: 20-21) a phase current profile by initializing one or more first profile parameters (Col. 5: 5-10, 54-60) defining at least a first portion of the phase current profile (Fig. 2A); determining whether a first performance criterion (Col. 5: 23-32) is satisfied based on operation of the switched reluctance motor drive using the one or more first profile parameters (Col. 5: 23-40, 54-60); and updating at least one of the one or more first profile parameters if the first performance criterion is not satisfied (Col. 5: 40-47); generating a phase current (Fig. 2C) according to the phase current profile (Col. 5:48-53); and applying the phase current to the SR motor (Fig. 1A:10).

Claim 18: A method comprising generating by a computer a phase current profile by initializing one or more first profile parameters (Col. 5: 5-10, 54-60) defining at least a first portion of the phase current profile (Fig. 2A); determining whether a first performance criterion (Col. 5: 23-32, constant current) is satisfied based on operation of the switched reluctance motor drive using the one or more first profile parameters (Col. 5: 23-40, 54-60); and updating at least one of the one or more first profile parameters if the first performance criterion is not satisfied (Col. 5: 40-47).

Claim 22: A SR motor system comprising a SR motor (Fig. 1A:10) and a phase current (Fig. 5: ix) applied to the SR motor, the phase current applied according to a

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phase current profile determined by: initializing one or more first profile parameters (Col. 5: 5-10, 54-60) defining at least a first portion of the phase current profile (Fig. 2A); determining whether a first performance criterion (Col. 5: 23-32, constant current) is satisfied based on operation of the switched reluctance motor drive using the one or more first profile parameters (Col. 5: 23-40, 54-60); and updating at least one of the one or more first profile parameters if the first performance criterion is not satisfied (Col. 5: 40-47).

Claim 37: a control system for use in a SR motor, the system operable to determine a phase current profile for a phase current used in the motor, the profile determined by: initializing one or more first profile parameters (Col. 5: 5-10, 54-60) defining at least a first portion of the phase current profile (Fig. 2A); determining whether a first performance criterion (Col. 5: 23-32, constant current) is satisfied based on operation of the switched reluctance motor drive using the one or more first profile parameters (Col. 5: 23-40, 54-60); and updating at least one of the one or more first profile parameters if the first performance criterion is not satisfied (Col. 5: 40-47).

Claims 3, 19, 23 and 38: the first profile parameters comprise a current turn-off instant (Fig. 2B: θ_{p} ; Col. 5: 32-37) and one or more first profile components (Fig. 2A: LP, Lm, θ_{Cy}), each first profile component defining a portion of the phase current profile (Fig. 2A).

Claim 4: the first profile components comprise a reference current profile (Fig. 2B: 28, θ_o) defining a portion of the phase current profile before the current

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turn-off instant (Fig. 2B: theta_p; Col. 5: 32-37) , and a current turn-off profile (Fig.

2B:28, theta_q) defining the portion of the phase current profile after the current turn-off instant.

Claim 5: the first performance criterion comprises a desire torque (Col. 5: 40-47).

Claim 9: approximating the phase current to the phase current profile(Col. 7: 62-8: 14)

Claim 10: approximating the phase current to the phase current profile by hysteresis control and hard chopping (Col. 6: 30-44)

Claim 11: determining whether a first performance criterion is satisfied comprises operating the SRM drive and empirically measuring a performance characteristic of the SRM drive (Col. 7:62-8: 17).

Claim 12: simulating operation of the SRM(Fig. 2c).

Claim 13, 20, 24 and 39: initializing a change parameter (Col. 6:1-16) related to one of the profile parameters (Col. 6: 1-16, current or speed) defining at least a first portion of the phase current profile (Fig. 2A); determining whether a first performance criterion (Col. 5: 23-32) is satisfied based on operation of the switched reluctance motor drive using the one or more first profile parameters (Col. 5: 23-40, 54-60); and updating at least one of the one or more first profile parameters if the first performance criterion is not satisfied (Col. 5: 40-47); generating a phase current (Fig. 2C) according to the phase current profile (Col. 5:48-53); and applying the phase current to the SR motor (Fig. 1A:10).

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 49, 51, and 53-59 are rejected under 35 U.S.C. 102(e) as being anticipated by Yifan (US 6,442,535).

Claim 49: A SR motor system comprising: a SR motor (Fig. 2: 12); a neural network comprising a plurality of neurons connected by a neural network, each neuron having weight (Col. 9: 1-13), wherein the neural network is operable to receive one or more inputs (Col. 9: 25-31) and to output a desired phase current profile (Col. 7:58-63) based on the inputs and the weights (Col. 10: 9-20); and a phase current applied to the SR motor according to the phase current profile output by the neural network (Col. 7:58-66).

Claim 51: The neural network comprises a plurality of layers including an input layer operable to receive the one or more inputs (Col. 3: 9-15), one or more hidden layers each comprising one or more neurons (Fig. 6c: Hidden layer), and an output layer operable to output the desired output phase current profile (Fig. 6c: Output layer).

Claim 53: the neurons are activated using a tan-hyperbolic activation function (Col. 9: 8-13).

Claim 54: the inputs comprise torque and speed (Col. 7: 58-60).

Claim 55: the inputs include a rotor angle input (Col. 9: 52-55).

Claim 56: The neural network is operable to output a desired phase current profile for a plurality of operational points on a torque-speed plane (Fig. 7).

Claim 57: the neural network is trained by back-propagation (Col. 9: 1-5).

Claim 58: the neural network is trained by determining the weights associated with each neuron, wherein the weights are determined by operating the SR motor at a plurality of points (Col. 10: 9-15), each point associated with a combination of test input values corresponding to the one or more inputs (Col. 10:9-20); obtaining input data and output data from the operation of the SR motor at each operating point (Col. 9: 52-66); and calculating the weights using the input data and the output data (Col. 10: 15-21).

Claim 59: each of the one or more inputs has an input value and wherein the neural network is operable to determine by interpolation a desired phase current profile for a combination of input values unique from the combinations of test input values used in determining the weights (Col. 2: 20-33).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yifan as applied to claim 51 above, and further in view of Quist et al (US 6,199,018).

Claim 52: Yifan teaches the limitations of claim 51, and referring to claim 52, the neural network comprises a hidden layer (Fig. 6c: Hidden layer) comprising five neurons (Col. 9: 5-7). Yifan does not teach two hidden layers. Quist et al teach a neural network having two hidden layers (Col. 20: 19-26). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the apparatus taught by Yifan to have two hidden layers as taught by Quist et al. The advantage of this would have been the ability to monitor a plurality of devices.

Allowable Subject Matter

9. Claims 1,26-36, and 41-48 are allowed.

Claims 6-8,14-17, 21, 25, and 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. They are: Sugiyama (US 6,008,601), Bradshaw et al (US 5,168,202), McHugh (US 5,923,141), Bahn (US 5,278,482), and Bose (US 4,707,650).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renata McCloud whose telephone number is (571) 272-2069. The examiner can normally be reached on Mon.- Fri. from 8 am - 5pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (571) 272-2800 ext. 37. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Renata McCloud
Examiner
Art Unit 2837

RDM


ROBERT NAPPI
SUPERVISORY PATENT EXAMINER